

Claims

- [c1] An electron beam tomography (EBT) scanning system comprising:
- an electron source generating an electron beam;
 - a target ring that receives said electron beam from said electron source, said target ring emitting an x-ray fan beam upon impingement of the electron beam on said target ring;
 - a pair of detector arrays arranged opposite said target ring detecting said x-ray fan beam; and
 - a collimator arranged concentrically between said target ring and said pair of detector arrays, said collimator having interior and exterior walls concentrically arranged with one another and surrounding a patient examination area, said interior and exterior walls having a first set of apertures aligned to collimate said x-ray fan beam into a first collimated beam having a first width, said first collimated beam forming at least one of a single and double tomographic slice, and said first collimated beam being detected by said pair of detector arrays.
- [c2] The EBT scanning system of claim 1 wherein said interior and exterior walls have a second set of apertures aligned to collimate said x-ray fan beam into a second collimated beam having a second width, said collimator being moved between first and second positions with respect to said single target ring to define said first and second collimated beams having said first and second widths, respectively.
- [c3] The EBT scanning system of claim 1 wherein said collimator is moved between first and second positions with respect to said single target to direct said first collimated beam solely onto one detector of said pair of detectors when in said first position, and onto both detectors of said pair of detector when in said second position.
- [c4] The EBT scanning system of claim 1 wherein said collimator includes a detector-only region having a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c5] The EBT scanning system of claim 1 wherein said collimator comprises a source/detector overlap region having a first set of pre-patient x-ray apertures for collimating said x-ray fan beam into said first collimated beam at said first width and a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c6] The EBT scanning system of claim 1 wherein said collimator includes a source-only region having a first set of pre-patient x-ray apertures for collimating said x-ray fan beam into said first collimated beam at said first width; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width.

[c7] An electron beam tomography (EBT) scanning system comprising:

- an electron source generating an electron beam;
- a target ring that receives said electron beam from said electron source, said target ring emitting an x-ray fan beam upon impingement of the electron beam on said target ring;
- a first detector array and a second detector array, said first and second detector arrays arranged opposite said single target ring detecting said x-ray fan beam; and
- a collimator arranged concentrically between said target ring and said first and second detector arrays, said collimator having interior and exterior walls concentrically arranged with one another and surrounding a patient examination area, said interior and exterior walls having:
 - a first set of apertures aligned to collimate said x-ray fan beam into a first collimated beam having a first width, said first collimated beam being detected by said first and second detector arrays; and
 - a second set of apertures aligned to collimate said x-ray fan beam into a second collimated beam having a second width, said second collimated beam being detected by said first and second detector arrays, said collimator being moved between first and second positions with respect

to said single target ring to define said first and second collimated beams having said first and second widths, respectively.

[c8] The EBT scanning system of claim 7 wherein said collimator is moved into a third position with respect to said target ring to direct said first collimated beam having said first width solely onto one of said first and second detector arrays.

[c9] The EBT scanning system of claim 7 wherein said collimator includes a detector-only region having a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c10] The EBT scanning system of claim 7 wherein said collimator comprises a source/detector overlap region having a first set of pre-patient x-ray apertures for collimating said x-ray fan beam into said first collimated beam at said first width and a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c11] The EBT scanning system of claim 7 wherein said collimator includes a source-only region having a first set of pre-patient x-ray apertures for collimating said x-ray fan beam into said first collimated beam at said first width; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width.

[c12] A collimator configured for use with an electron beam tomography (EBT) system, said EBT system having a target ring emitting an x-ray fan beam and first and second detector arrays detecting a collimated region of the x-ray fan beam, said collimator comprising:

interior and exterior walls concentrically arranged with one another and surrounding a patient examination area, said interior and exterior walls having:

a first set of apertures aligned to collimate an x-ray fan beam into a first collimated beam having a first width, said first collimated beam being detected by first and second detector arrays when said collimator is in a first position, said first collimated beam being detected by one of said first and second detector arrays when said collimator is moved to a second position; and

a second set of apertures aligned to collimate said x-ray fan beam into a second collimated beam having a second width, said second collimated beam being detected by said first and second detector arrays when said collimator is moved to a third position, and said collimator being moved between said first, second, and third positions with respect to said target ring to define said first and second collimated beams having said first and second widths, respectively.

[c13] The EBT scanning system of claim 12 wherein said collimator includes a detector-only region having a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c14] The EBT scanning system of claim 12 wherein said collimator comprises a source/detector overlap region having a first set of pre-patient x-ray apertures for collimating said x-ray fan beam into said first collimated beam at said first width and a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c15] The collimator of claim 12 further including a source-only region having a first set of pre-patient x-ray apertures for collimating said x-ray fan beam into said first collimated beam at said first width; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width.

[c16]

An electron beam tomography (EBT) scanning system comprising:

an electron source generating an electron beam;
a target ring that receives said electron beam from said electron source, said target ring emitting an x-ray fan beam upon impingement of the electron beam on said target ring;
a first detector array and a second detector array, said first and second detector arrays arranged opposite said target ring detecting said x-ray fan beam; and
a collimator arranged concentrically between said target ring and said first and second detector arrays, said collimator having interior and exterior walls concentrically arranged with one another and surrounding a patient examination area, said interior and exterior walls having:
a first set of apertures aligned to collimate said x-ray fan beam into a first collimated beam having a first width, said first collimated beam being detected by first and second detector arrays when said collimator is in a first position, said first collimated beam being detected by one of said first and second detector arrays when said collimator is moved to a second position; and
a second set of apertures aligned to collimate said x-ray fan beam into a second collimated beam having a second width, said second collimated beam being detected by said first and second detector arrays when said collimator is moved to a third position, and said collimator being moved between said first, second and third positions with respect to said target ring to define said first and second collimated beams having said first and second widths, respectively.

[c17]

The EBT scanning system of claim 16 wherein said collimator includes a detector-only region having a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c18]

~~The EBT scanning system of claim 16 wherein said collimator comprises a~~
source/detector overlap region having a first set of pre-patient x-ray apertures



for collimating said x-ray fan beam into said first collimated beam at said first width and a first set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width and a second set of post-patient x-ray apertures for shielding said pair of detector arrays from scattered x-rays.

[c19] The collimator of claim 16 wherein said collimator includes a source-only region having a first set of pre-patient x-ray apertures for collimating said x-ray fan beam into said first collimated beam at said first width; and a second set of pre-patient x-ray apertures for collimating said x-ray fan beam into a second collimated beam at a second width.

10064182, 06/19/2016